

PT061 Occurrence of Estrogenic Compounds at Swinery Waste Treatment Plant.

Furuichi, T.¹, Suzuki, K.², Kannan, K.³, Giesy, J.P.⁴ and Masunaga, S.¹

¹Yokohama National University, Yokohama, Japan. ²National Institute of Livestock and Grass Science, Ibaraki, Japan. ³New York State Department of Health, Albany, NY, USA. ⁴Michigan State University, East Lansing, MI, USA.

The aim of the present study was to quantitatively characterize the substances that were contributing to the estrogenic activity in a pilot scale swinery wastewater treatment process. In order to achieve this aim, the estrogenic activity were measured with an *in vitro* gene expression bioassay using MVLN cells and various potentially estrogenic substances were detected and quantified using liquid chromatographmass spectrometer (LC/MS) and liquid chromatograph tandem mass spectrometer (LC/MS/MS). The treatment process consisted of a series of up-flow anaerobic sludge blankets (UASB) and trickling filter. Samples were collected at each treatment step. Removal rates of both estrogenic activity and compounds were calculated as ratios of those in effluent against influent. The removal rate of estrogenic activity was over 97%. The trickling filter was playing the major role in estrogenic activity removal. The removal rates of estrogenic compounds ranged from 44% to 99%. To further identify the substances contributing to the estrogenic activities in the wastewater, the sample extracts were fractionated into twelve fractions by HPLC. The estrogenic activity was detected only in the fractions No. 7, 8, 9 and 10. Estrone (E1), 17 β -estradiol (E2), 17 α -estradiol (α E2), estriol (E3), bisphenol A (BPA) and equol (EQO) were detected in these fractions, indicating that these substances were responsible for the estrogenic activity. The ratios of E2-EQC (E2-equivalent derived from chemical analysis) to E2-EQB (E2-equivalent derived from bioassay) in the four fractions collectively (No. 7, 8, 9 and 10) were E1: 24%, E2: 27%, α E2: <1%, E3: 3%, BPA: <1%, EQO: 3% in the influent, and E1: 27%, E2: 3.5%, α E2: <1%, E3: 3%, BPA: <1%, EQO: <1% in the effluent. These results revealed that the major causal substances to the estrogenic activity were natural estrogens such as E1 and E2. The existence of unknown estrogenic substances in swinery wastewater was also indicated.